# REMARKS

## I. INTRODUCTION

Claims 4-6, 8-12, 15-16, and 30-32 are pending in the application. By this Amendment, claim 30 is amended to more particularly recite the features of the method for extruding a peroxide crosslinked polymer tube. Claims 1-3, 7, 13, 14, and 17-29 were previously canceled without prejudice or disclaimer. In view of the following remarks, Applicants respectfully submit that the application is in condition for allowance and request a notice stating the same. Reconsideration and withdrawal of the rejections are respectfully requested.

## II. CLAIM REJECTIONS UNDER 35 U.S.C. § 103(a)

### A. Claims 4, 5, 8-12, 16, and 30-32 – Ootsuji, Fuwa, Gould, Schmid, and Henkel

On pages 2-6 of the Office Action, the Examiner rejects claims 4, 5, 8-12, 16, and 30-32 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 3,868,436 to Ootsuji *et al.* ("Ootsuji"), in view of U.S. Patent No. 3,928,525 to Fuwa *et al.* ("Fuwa"), U.S. Patent No. 3,331,100 to Gould, U.S. Patent No. 5,804,116 to Schmid *et al.* ("Schmid"), and DE 2303830 to Henkel *et al.* ("Henkel"). The rejection is respectfully traversed. Nevertheless, in the interest of expediting prosecution, claim 30 is amended to more particularly recite that the extruder in the method for extruding a peroxide crosslinked polymer tube is a screw extruder. Reconsideration and withdrawal of the rejection are respectfully requested in view of the following remarks.

"Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some ***rational underpinning*** to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) (emphasis added); *accord KSR Int'l v. Teleflex, Inc.*, 82 USPQ2d (BNA) 1385 (2007).

In the Office Action, the Examiner continues to reject the enumerated claims based on the proposition that the recited method is obvious in view of a tenuous combination of numerous patent documents involving disparate aspects of polymer extrusion. Using impermissible hindsight reconstruction based on the Applicants' disclosure as well as a disregard for the teachings of each document as a whole, the Examiner picks and chooses individual features and steps from the multitude of documents to meet the limitations of the claims. Applicants

respectfully submit that this is improper, that the cited documents are not combinable in the fashion asserted by the Examiner, and that the applied documents, even if combined, do not meet the features recited in at least claim 30.

In rejecting claim 30, the Office Action acknowledges on page 4 that Ootsuji fails to teach or suggest at least the recited steps of:

> ***heating the mixture in the screw extruder with an external heating unit*** to a temperature above the crystallite melting point but below the crosslinking temperature;
>
> ***controlling the temperature of the mixture in the screw extruder with the external heating unit and an internal cooling unit***;
>
> continuously feeding the mixture from the screw extruder to an extrusion die, wherein ***a melting pressure before entry to the extrusion die is approximately 700-1500 bar***.

(emphasis added). In view of these clear deficiencies in Ootsuji, the Office Action cites Fuwa, Gould, Schmid, and Henkel and concludes that it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to have modified the method of Ootsuji accordingly. The Applicant respectfully disagrees and traverses the rejection for at least the following reason: Ootsuji, alone or in combination with Fuwa, Gould, Schmid, and Henkel, cannot reasonably be considered to teach or suggest the features of claim 30.

First, with regard to the proposed modification of Ootsuji based on Fuwa, it is respectfully submitted that the Examiner misconstrues how one of ordinary skill in the art would understand and possibly combine these documents. Ootsuji relates solely to an improved process for the production of electrical conductors covered with a crosslinked material. *See* Ootsuji, Title. More specifically, Ootsuji is directed to "the production of cables covered with a cross-linked material by feeding a conductor and a cross-linkable material covering the conductor through a long land portion of an extruding die unit." Ootsuji, Abstract. The "cross-linking reaction is substantially completed within the land portion" and the cross-linked material is cooled "within a cooling device housing a pressurized cooling fluid therein." *Id.* The improved process apparently relates to the fact that "the aforementioned feeding of the conductor is carried out under a braking force counteracting a pull generated along the cable by the pressurized cooling fluid." *Id.* Thus, Ootsuji identified problems in prior long-land die processes utilizing

pressurized cooling devices and developed a device and process to apply a braking force to the conductor to counteract the pulling forces generated by the cooling device. In particular, Ootsuji identified that "a pulling force is generated by the pressurized fluid in a cooling device [disposed adjacent to the land portion of the die]" (column 1, lines 64-65) and that, "unless the operational conditions are suitably selected, the quality of the product becomes inferior" (column 2, lines 2-4). The asserted purpose of Ootsuji's improved process, therefore, is to cancel any irregularity generated by the pulling force of the conductor caused by the pressurized cooling fluid" and thereby stabilize the production of the cables. *See* column 2, lines 41-48.

Fuwa, on the other hand, purportedly relates to an improved method for vulcanizing polymers in a long-land die by use of a special class of coagents having specific properties to maintain a continuous film between the inner surface of the die and the polymer product. *See* Fuwa, Abstract. Fuwa's method of applying such coagents is apparently applicable to the manufacture of electrical cables having a vulcanized insulation layer. *See* Fuwa, column 2, lines 64-66; FIG. 1. Like Ootsuji, Fuwa discloses that, the vulcanized material, "after emerging from the die, is passed into a [pressurized] water cooling apparatus 5 which is directly connected to the die piece 33." Fuwa, column 8, lines 39-41. To the extent that one of ordinary skill in the art would look to combine Ootsuji and Fuwa, it is respectfully submitted that the only reasonable modification to Ootsuji would be the application of the coagents to lubricate the extrudate in Ootsuji's long-land die, which Ootsuji already does to some extent (*see* Ootsuji, column 10, lines 1-15). Likewise, the only reasonable modification to Fuwa based on Ootsuji would be to apply a braking force to the conductor to counteract any pulling forces generated by the water cooling apparatus. Although Fuwa also discloses that the use of the coagents would also be applicable to the manufacture of pipes of vulcanized polymer (*see* column 8, lines 66-68; FIG. 2), it is respectfully submitted that it would <u>not</u> have been obvious to modify Ootsuji's method of producing covered electrical conductors to instead apply to the production of cross-linked polymer tubes. If so, the proposed modification would change the principle of operation of Ootsuji, rendering inventive braking apparatus unsatisfactory for its intended purpose. *See* M.P.E.P. § 2143.01 (V-VI). Accordingly, it is respectfully submitted that the proposed combination of Ootsuji and Fuwa does not render at least claim 30 unpatentable.

Second, the Office Action cites Schmid to account for the acknowledged deficiencies in Ootsuji regarding the recited internal cooling unit. This proposed combination is also believed to be improper. Schmid, for example, apparently relates to a method for the manufacture of shaped bodies formed from plastics-filler mixtures having a high filler content." Schmid, Title. In fact, Schmid specifically states that the method is directed to "plastic-filler mixtures will filler contents of more than 50% by volume, preferably from 65 to 90% by volume" (Schmid, Abstract) and is restricted to such high filler mixtures (*see* Schmid, column 1, lines 50-52). Neither one of Ootsuji and/or Fuwa teach or suggest extruded materials having high filler contents, specifically more than 50% by volume. Accordingly, it is respectfully submitted that one of ordinary skill in the art would not look to the method or apparatus of Schmid regarding the structure of the extruder to modify Ootsuji and/or Fuwa. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. *See* M.P.E.P. § 2143.01(III).

Third, even if all of the cited documents were combined by one of skill in the art as suggested by the Examiner, the resulting process would still not teach at least the step of "continuously feeding the mixture from the screw extruder to an extrusion die, wherein ***a melting pressure before entry to the extrusion die is approximately 700-1500 bar***." As acknowledged in the Office Action, none of Ootsuji, Fuwa, Schmid, and/or Gould, alone or in combination, teach or suggest the recited melting pressure. The Office Action cites Henkel as purportedly teaching this feature. As noted in the English language Abstract of Henkel, however, the recited pressure of "1000 kg/cm$^2$" (980.6 bar) relied upon by the Examiner relates to "pressure during cross-linking." Therefore, this pressure is not "a melting pressure before entry into the extrusion die" as recited in claim 30, but rather is a pressure in the extrusion die where higher temperatures and pressures are associated with the crosslinking of the extrudate ("A uniform dispersion of cross-linking agent (A) in high-molecular material (B), made in a screw extruder, is ***cross-linked under higher temps. and pressures than those in the extruder***, by fluidizing and extruding through a die." Henkel, Abstract (emphasis added).

In view of the foregoing, it is respectfully submitted that at least amended claim 30 is allowable over the proposed combination of Ootsuji, Fuwa, Gould, Schmid, and Henkel. None of the documents, alone or in combination, are believed to teach or suggest all of the recited

features, including the recited melting pressure before entry to the extrusion die, nor is the proposed combination supported by a rational underpinning. Claims 4, 5, 8-12, 16, and 31-32 depend from claim 30 and are submitted as being allowable for at least the same reasons. Reconsideration and withdrawal of the rejection are respectfully requested.

**B. Claims 6 and 15 – Ootsuji, Fuwa, Gould, Schmid, Henkel, and Munsell**

On pages 6-7 of the Office Action, the Examiner rejects claims 6 and 15 under 35 U.S.C. §103(a) as being unpatentable over the proposed combination of Ootsuji, Fuwa, Gould, Schmid, and Henkel, as applied to claim 30 above, and further in view of U.S. Patent No. 3,095,608 to Munsell ("Munsell"). The rejection is respectfully traversed. Claims 6 and 15 depend from claim 30 and are submitted as being allowable for at least the same reasons. Munsell is not believed to cure the above-noted deficiencies of the proposed combination of Ootsuji, Fuwa, Gould, Schmid, and Henkel, particularly with respect to the recited melting pressure before entry to the extrusion die. Reconsideration and withdrawal of the rejection are respectfully requested.

**C. Claims 4, 5, 8-12, 16, and 30-32 – Fulconis, Ootsuji, Gould, and Schmid**

On pages 7-8 of the Office Action, claims 4, 5, 8-12, 16, and 30-32 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,126,661 to Fulconis ("Fulconis") in view of Ootsuji, Gould, and Schmid. The rejection is respectfully traversed. Nevertheless, in the interest of expediting prosecution, claim 30 is amended to more particularly recite that the extruder in the method for extruding a peroxide crosslinked polymer tube is a screw extruder. Reconsideration and withdrawal of the rejection are respectfully requested in view of the following remarks.

Like the rejection based on Ootsuji, Fuwa, Gould, Schmid, and Henkel, the Office Action also uses impermissible hindsight reconstruction based on the Applicants' disclosure to reject the claims in view of Fulconis, Ootsuji, Gould, and Schmid. The Applicants respectfully submit that this is improper, that the cited documents are not combinable in the fashion asserted by the Examiner, and that the applied documents, even if combined, do not meet the features recited in at least claim 30.

Claim 30, as amended, recites, inter alia, "supplying a mixture to a screw extruder, the mixture comprising: a crosslinkable polymer, a crosslinking agent, and a stabilizing agent" and "heating the mixture in the screw extruder with an external heating unit to a temperature above the crystallite melting point [of the polymer] but below the crosslinking temperature." Thus, claim 30 requires that the crosslinkable polymer mixture be supplied to a screw extruder, wherein it is heated to a temperature above the polymer crystallite melting point.

In contrast, Fulconis is believed to teach away from use of a screw extruder heated to temperatures above the polymer crystallite melting point. Fulconis purportedly "relates to a process for producing products of cross-linked thermoplastic material," in particular "products of cross-linked ***high*** density polyethylene." Fulconis, column 1, lines 5-9 (emphasis added). Fulconis states that with mixtures of "***low*** density polyethylene" and a cross-linking agent of organic peroxide, "it is quite possible to differentiate the shaping phase or transformation phase from the cross-linking phase or vulcanization" because "the temperatures required for the transformation (extrusion, injection, forming) are lower than the temperature it is necessary to reach for producing the decomposition of the conventionally employed organic peroxide." *See* Fulconis, column 1, lines 16-27. According to Fulconis, however, "[t]he situation is different when it is necessary to cross-link high density polyethylene" because "[t]he thermoplastic material only has a sufficiently low viscosity permitting its forming at temperatures of 170°-220° C." Fulconis, column 1, lines 40-47. Furthermore, because such "temperatures are higher than the threshold of decomposition of peroxides . . . it is impossible to produce objects of cross-linked high density polyethylene according to the processes for cross-linking low density polyethylene." Fulconis, column 1, lines 48-54. Thus, ***Fulconis teaches a ram extrusion process*** in which "the forming to shape is carried out directly on a mixture of powder of high density polyethylene and cross-linking agent, the product is sintered, then cross-linked with no risk of a heating due to the shearing." Fulconis, column 2, lines 18-22.

In view of the foregoing, use of a heated screw extruder is effectively excluded by the underlying purpose of Fulconis because such an extruder would not allow separation of the forming and cross-linking phases during production of cross-linked ***high density polyethylene*** products. That being the case, a proposed combination with Ootsuji, Schmid, and/or Gould, would be unreasonable. Furthermore, because the entire longitudinal extent of Fulconis between

material supply hopper 11 and plate opening 15 would be considered an "extrusion die" (i.e., not an extruder), none of the cited documents, alone or in combination, teach or suggest the recited step of "continuously feeding the mixture from the screw extruder to an extrusion die, wherein a melting pressure before entry to the extrusion die is approximately 700-1500 bar." Accordingly, at least amended claim 30 is allowable over the proposed combination of Fulconis, Ootsuji, Gould, and Schmid. None of the documents, alone or in combination, are believed to teach or suggest all of the recited features, including the recited melting pressure before entry to the extrusion die. Claims 4, 5, 8-12, 16, and 31-32 depend from claim 30 and are submitted as being allowable for at least the same reasons. Reconsideration and withdrawal of the rejection are respectfully requested.

### D. Claims 6 and 15 – Fulconis, Ootsuji, Gould, Schmid, and Munsell

On pages 8-9 of the Office Action, claims 6 and 15 are rejected under 35 U.S.C. §103(a) as being unpatentable over the proposed combination of Fulconis, Ootsuji, Gould, and Schmid, as applied to claim 30 above, further in view of Munsell. The rejection is respectfully traversed. Claims 6 and 15 depend from claim 30 and are submitted as being allowable for at least the same reasons. Munsell is not believed to cure the above-noted deficiencies of the proposed combination of Fulconis, Ootsuji, Gould, and Schmid. Reconsideration and withdrawal of the rejection are respectfully requested.

## III. CONCLUSION

Claims 4-6, 8-12, 15-16, and 30-32 are pending in the application. All of the stated grounds of rejection are believed to have been properly traversed or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. Applicant believes that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is hereby invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment is respectfully requested.

Respectfully submitted,

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